

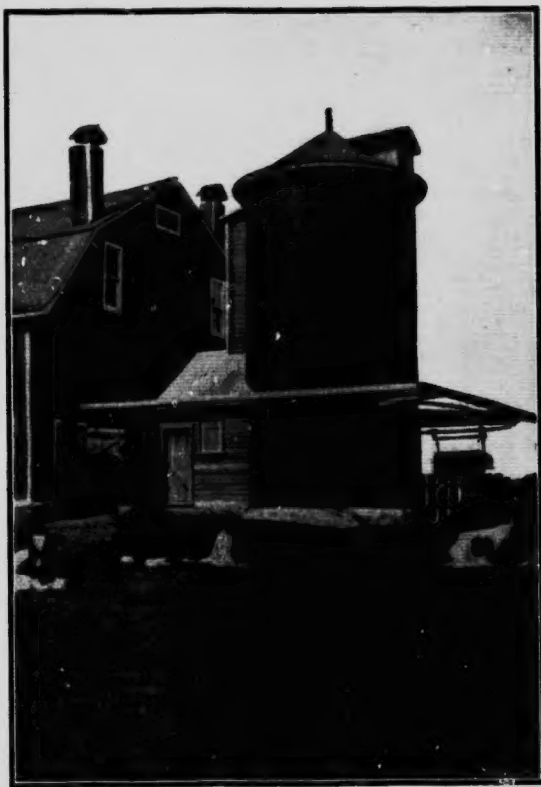
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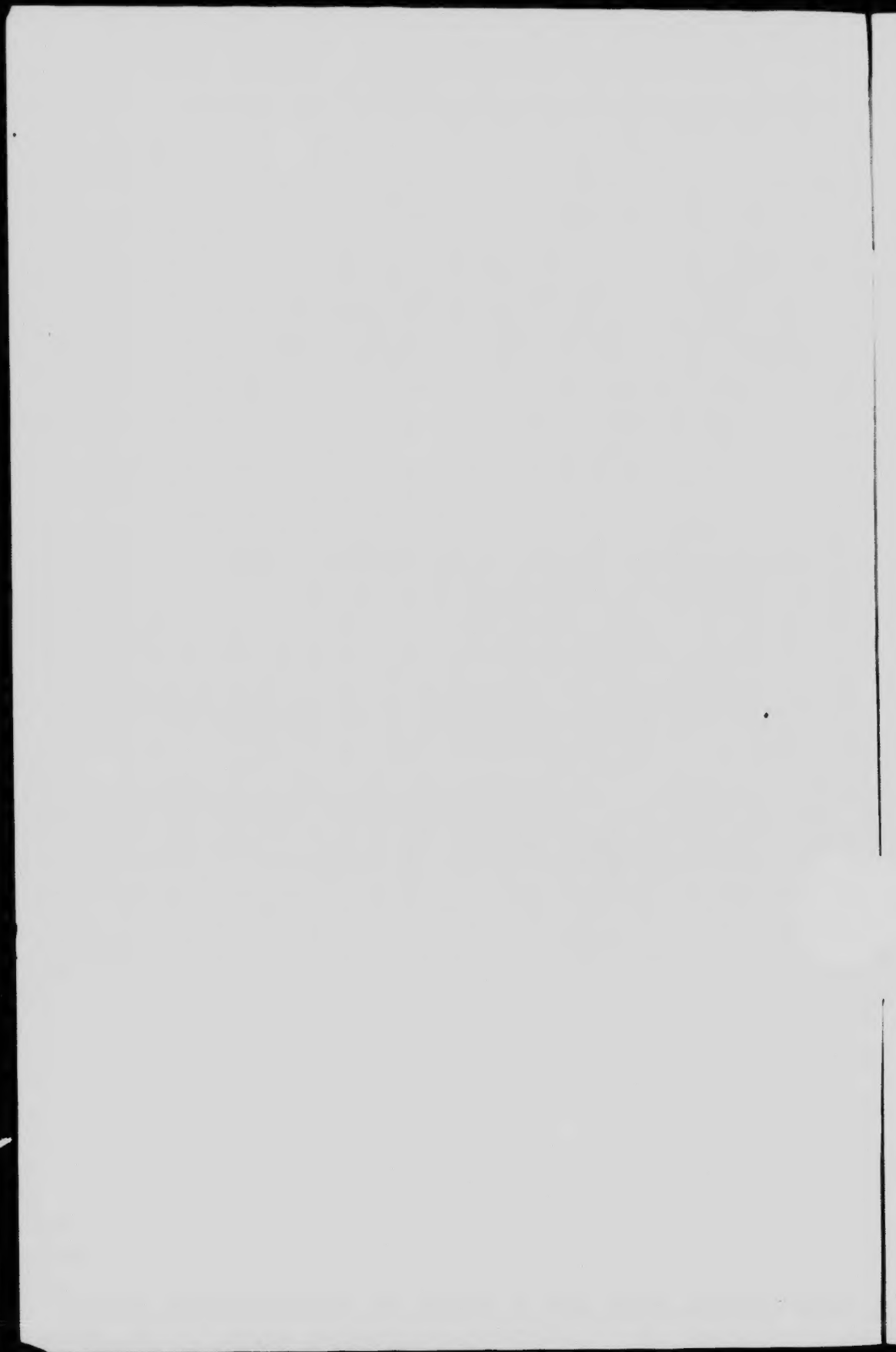
The Provincial Department of Agriculture, Edmonton, Alta

— THE —
SILLO IN ALBERTA

By S. G. CARLYLE and J. McCAIG



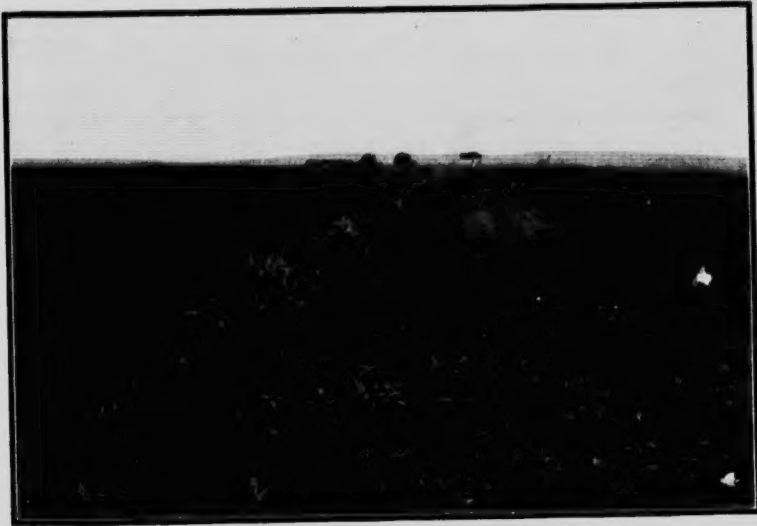
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MINISTER OF AGRICULTURE



THE SILO IN ALBERTA

Ensilage

The silo is a mark of economy and progress in the feeding of live stock. The first live stock enterprises of the Province were supported on the natural grasses of the prairie in both winter and summer. The limiting of the range by settlement transferred a good deal of the live stock to the farms. The feed most readily available for winter keep on the farms is prairie hay and green feed, with occasionally a little grain. Dry feed alone is not adequate or profitable. It just brings the cattle through, but does not hasten growth or give real good condition. It is necessary on land that is increasing in price to get quicker



ENSILAGE CORN AT MEDICINE HAT

and larger returns than can be had from having cattle make all their gains in the grass season. The dairy industry especially depends for its success and profit on the furnishing of a rich variety of foods throughout the year. In addition to richer and more varied feeding, we likewise need to furnish good shelter. The silo means comfortable housing and liberal feeding.

Economy of Ensilage

While grass supplies practically all the feed for stock during the summer months, the problem that confronts the farmer is to furnish a cheap, nutritious, and preferably a succulent feed for the winter months. This feed can be best supplied through

the silo. Roots are a succulent feed, and are especially valuable for cattle, but owing to the amount of labor involved and the risk of damage from early frost, they cannot be called economical. In any case, roots form only a small part of the food consumed, whereas good silage will furnish nearly all the roughage a cow needs, and the danger of damage to the crop by frost is very slight. The silo preserves for winter use a larger proportion of the nutritive elements of green fodder than is possible by any other method.

Ensilage is valuable chiefly for dairy, fattening, and stock cattle and sheep. It should be sparingly used as horse feed, as it induces colic easily. It is not profitable or suitable for swine.

Kinds of Ensilage

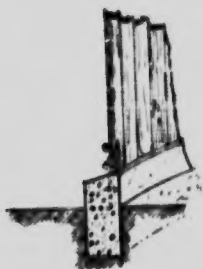
Corn is pre-eminently the plant from which ensilage has been made in Eastern Canada and in the Eastern and Middle States, but in the greater part of the Western Provinces the corn plant does not mature sufficiently to make good ensilage within the growing season. In the southern part of the Province, for example in the Medicine Hat, Bow Island and Lethbridge districts, corn has proved a success. Where it can be grown satisfactorily it is the best ensilage crop on account of the large yields it gives.

Even though corn cannot be grown profitably in all parts of the Province, it is still possible to profit by the use of the silo in Alberta. As substitutes for corn for ensilage, alfalfa, green oats and green peas and oats mixed, have been used in various parts of Alberta for the past three or four years, and have proved satisfactory. In places where alfalfa is grown successfully it often happens that wet weather is encountered about the time it is ready for the first cutting, with the result that it is either left standing too long waiting for good weather, or it is cut and is damaged considerably by rains. When this is likely to occur it is a saving to cut at the proper time, run immediately through a cutting box, and blow into the silo.

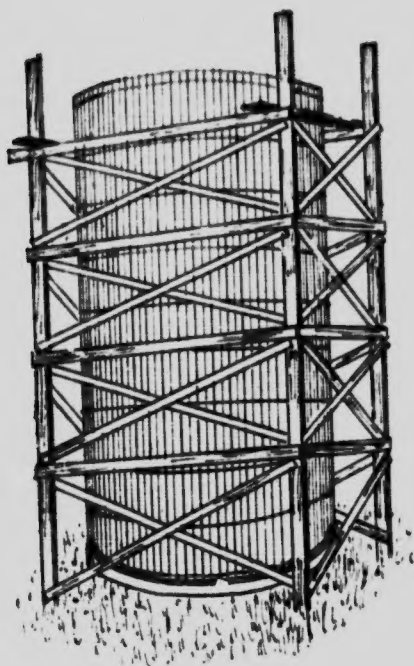
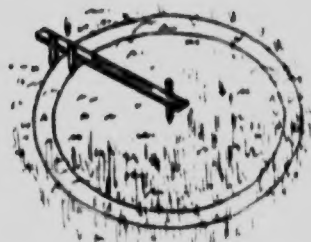
Oats can be grown successfully in any part of Alberta, and if cut when the heads are just turning, or when the grain is nearly in the dough stage, and put immediately into the silo, the ensilage makes excellent feed. The oats can be sown in the spring after all the crop that is intended for threshing is put in, and can usually be cut and put into the silo before the grain crop ripens, thus not interfering with the production of grain crops. If seed peas are available it will greatly improve the ensilage to sow at least one bushel of peas to the acre, mixed with the oats. This, fed in conjunction with tame or native hay and a small allowance of concentrated feed, will keep the animals in excellent condition through the winter months, and will afford a great saving in roots and in oat and barley chop.

Ripening of the Fodder in the Silo

It is necessary to know something of the preserving uses of the silo. Ensilage undergoes a ripening process similar to that of cheese. The chief result of the ripening is that the proteins are made more digestible. In addition to this the fibres are



Sketch of Joint



Sketch of Door

BUILDING THE SILO

softened and new relishing odors are developed. The ripening changes are brought about by fermentation. The essential change is due to the action of organized ferments called enzymes in the living plant cell. There are likewise secondary putrefactive changes due to bacteria.

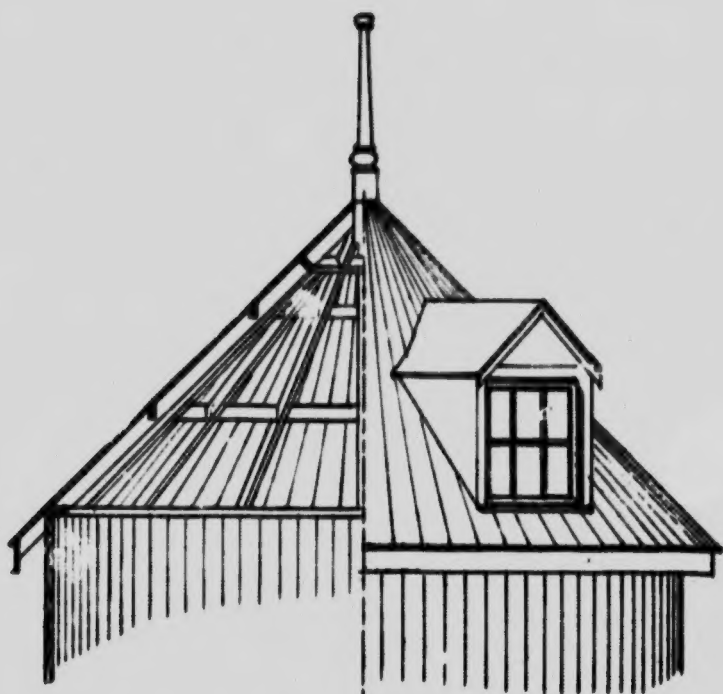
There are three conditions necessary for fermentation. One of these is moisture. Most ensilage plants have this in sufficient proportion, which is about 70 per cent., but with certain crops, or with crops in certain condition, the moisture content must be increased to make up for loss of moisture by evaporation. Proper fermentation of ensilage is dependent likewise upon the exclusion of air. The desirable organisms for silage production develop best in the absence of air. In addition to this, the presence of air is favorable to the development of undesirable or destructive micro-organisms. The activities of micro-organisms depend likewise upon temperature conditions. The most suitable temperature is found to be between 75 and 105 degrees F. The temperature resulting from initial fermentation is necessary for the inducing of activity in desirable micro-organisms, and is sufficient to this end.

The three common changes noticeable in the ripening process in ensilage are an increase in temperature, the development of acidity, and the production of odors. Usually the temperature begins to rise immediately, and continues to rise for from one to two weeks, when the maximum is reached. It then as gradually decreases. Maximum acidity and the production of odors are likewise usually reached in a couple of weeks also.

Materials for Construction

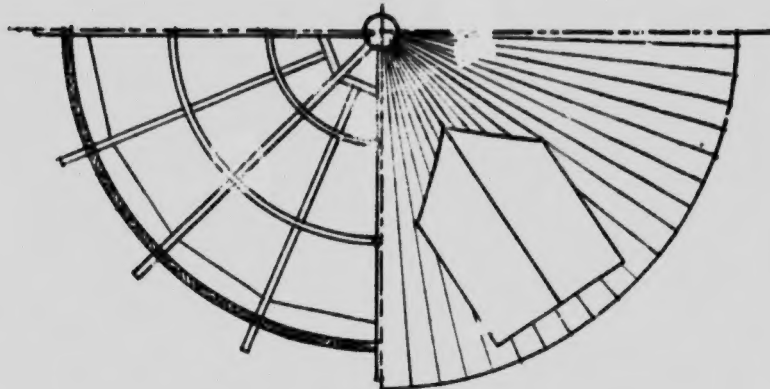
There are several different kinds of silos, but the stave and the concrete silos are the two in most common use. On account of the lack of gravel over the greater part of Alberta, and also on account of frost gathering on the inside of the wall, the concrete silo is not likely to become popular. Stave silos with concrete foundation are more common than any other kind in Canada, and are likely to be the kind most used in Alberta. The material is easier to get, and they are more easily and cheaply constructed than any other kind of silo is. If good material is used and they are well constructed they last for a number of years. Circular stave silos have proved satisfactory on the Demonstration Farms. In square or octagonal silos the ensilage does not settle at the angles, and usually some of the feed spoils.

Native hemlock and spruce staves can be used, provided the timber is sound and free from knots, but British Columbia Douglas fir is the best material for silos in Western Canada. It is easily obtained, and, being full of pitch, which acts as a preservative, lasts considerably longer than native lumber. The staves should be 2x6 inches, and if tongued and grooved and bevelled, will make a strong, tight structure. The staves may be of one length but if the silo is to be over thirty feet in height, two lengths will be less expensive. In a silo thirty-two feet high, eighteen and fourteen-foot lengths will permit the breaking of joints alternately. It should be painted.



HALF SECTION

HALF ELEVATION



HALF PLAN OF ROOF.

DETAILS OF ROOF STRUCTURE

The Foundation

In building a silo a good foundation is necessary. It should be laid one to two feet in depth, depending on the nature of the soil, and should be a foot above the general level of the ground. The footing should be one and a half or two feet wide at the bottom, and may be tapered to eight inches wide at the top. Some farmers prefer the silo to extend four or five feet below the surface of the ground, but this means a much more expensive foundation, greater difficulty in securing drainage and greater labor in getting the ensilage from the silo. Care should be taken that the top of the foundation on which the staves are to be placed is a perfect circle. When building the wall, five or six pieces of flat iron should be put in the cement at equal distances, and should extend above the wall three or four inches to act as anchors. In these projecting ends small holes should be drilled, and the irons bolted to the staves. This will prevent the wind from shifting the silo off the foundations.

Setting Up

In setting up the staves it will be found convenient to use lath or ordinary flour barrel staves, tacked both on the inside and the outside, to hold the staves in place until the iron hoops are put on. When the points are reached where the doors are to be located, one stave should be sawed nearly through in the right place for the top and bottom of each door, cutting with the saw a bevel of about 45 degrees. When the wall is finished the saw may be inserted at these points, and the other staves sawed to secure a door of the desired width. The pieces sawed out of the staves should be used in making the doors. A circular plate made of 2x6 material should be nailed around the inside of the staves, level with the top, to carry the ends of the rafters and roof boards.

Band iron or round iron may be used for hoops, round iron being preferred on account of offering less friction in tightening or adjusting. Hoops of five-eighths inch round iron are recommended, and they should be in two lengths to facilitate tightening. The best way to secure the hoop is by means of patented cast-iron lugs, which can usually be secured through hardware merchants or implement dealers. The hoops should be long enough so that they can be lengthened when the silo is being filled, and should be threaded far enough back so that they can be tightened when the silo is empty.

Care should be taken to have the silo air-tight. Great care is necessary at the doors, and where the staves rest on the foundation wall the angle should be plastered inside with a light coat of cement. The staves should be set as close to the inner edge of the foundation wall as possible, so as not to leave a shoulder, as in the settling process an air space would be made which would cause the ensilage to spoil.

Roof and Floor

A cheap and suitable roof may be constructed by taking boards the desired length and cutting them diagonally, putting the base of the board on the plate and the point at the centre,

having a turned post about eight or ten inches in diameter for the points of these boards to be nailed to or to form the hub as it were. An opening should be built in the roof similar to a pediment window for the filling of the silo. In parts of the Province where strong winds are prevalent it may be necessary to have rafters to give strength to the roof. These need not be close together. For a silo fifteen feet in diameter eight rafters will be sufficient. The pitch should be the same as that of the barn. The accompanying cut shows how the roof should be constructed.

A satisfactory floor for the silo in this Province is clay well tamped. Concrete may be used but it increases the cost. It is necessary to provide drainage for the silo. This is sometimes provided for by making a saucer-shaped floor, from the centre of which a tile drain is laid. Surplus moisture may also escape at the foundation where the staves rest on the concrete foundation. If there is a lot of moisture being carried away, the ensilage has probably been put in too green; if there is no moisture, it is too dry.

Location

The location of the silo is important. It may be built close to the barn with only the feed chute of the silo between, or it may be built at a distance of ten or twelve feet so as to leave space for a feed room between the silo and the cattle barn. The silo should be fastened to the barn by guy wires.

Capacity of Different Sized Silos

The following table gives the capacity in tons of corn ensilage of silos of different dimensions, and also gives the number of cows that may be fed from the contents of each silo for a period of 180 days, and at the rate of forty pounds per day for each animal. From this table it will be easy to estimate the area required for the growing of ensilage crops, by putting the yield per acre at from six to ten tons for corn and four to six tons for green oats. A cubic foot of corn ensilage weighs about forty pounds, and of green oats about thirty-three pounds. To get capacity, silos should be built high rather than of large circumference, as the deeper the silo the greater the pressure. This pressure excludes the air.

Dimensions	Capacity in Tons.	Cows it will keep for 180 days, 40 lbs. per day.
12x24	49	13
12x28	60	15
14x22	61	17
14x24	67	19
14x28	83	22
14x30	93	23
16x24	87	24
16x26	97	26
16x30	119	30

Filling the Silo

The blower is the machine almost exclusively used for filling the silo. A difficulty with this machine is that the ensilage is not properly mixed. The heavier parts, including the grain, are thrown against the opposite wall and the lighter parts fall at the side nearest the opening. It is necessary to have two or three men in the silo to mix the ensilage and tramp it, to prevent uneven settling and to exclude the air. If the silo is to be filled with green feed especially it will be necessary to tramp it well, when filling, to exclude the air, as the oat stem, unlike the corn stalk, is hollow and light and will not pack so well of its own weight. It should likewise be well tramped for four or five days after being filled, in order to save waste of ensilage in the first foot or so at the top. If it is too ripe or dry, water should be added while the ensilage is being put in, or it will burn and become useless. Water may be applied either in the silo or it may be applied with a sprinkler on the feed table as the feed passes into the blower.

Method of Using Ensilage

Ensilage is a combination of roughage and succulent feed. The succulence and flavor of properly cured ensilage make it a relishing feed. This quality makes it an advantage to mix it with other feeds. Cut feed or chaff may be mixed with it, and if the silage is sour or over-acid from being cut too green the addition of cut feed is necessary. Sour ensilage alone may cause cattle to scour. The chop that is fed should be mixed with the ensilage also. Finely ground chop is not easily regurgitated as it forms a pasty mass when bolted alone. When it is mixed with ensilage the digestive process is more complete. Cattle may be fed from thirty to forty pounds daily, and young animals in proportion to their weight. Sheep can use from two to four pounds daily, but in-lamb ewes should not get more than two pounds. Spoiled or mouldy ensilage should not be fed. It is dangerous for stock and should be thrown out. The use of ensilage is not limited to the winter feeding season. On dairy farms in Eastern Canada a supply is commonly held over in the spring to sustain the milk flow over dry, mid-summer pasture.

When feeding ensilage in warm weather a couple of inches should be removed from the top each day, otherwise the surface exposed to the air will begin to spoil if allowed to remain longer. It is advisable to build two small silos rather than one very large one. It is not advisable to build under twenty-four feet in height, as there is sometimes not enough pressure to make good ensilage, thirty feet being better than twenty-four.

